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AUTHOR Gibson, Lay James: And Others
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ABSTRACT

Organized in a series of logically ordered planning components, this citizen's handbook seeks to develop local expertise for evaluating major economic impacts (economic growth or decline) in nonmetropolitan centers. In each section the user is guided through a set of simple calculations which provide quantitative answers regarding a particular area of impact. An introduction discusses use of the handbook and lists some preliminary questions which must be answered. The remainder of the handbook is divided into two parts concerning the two kinds of impact: growth and decline. Part A deals with new development and part B with the loss of a major employer. Both parts are parallel in outline since the same issues must be confronted. The four major topics in each part are (1) economic and demographic impacts (employment, population), (2) housing and transportation, (3) environmental services (water, sewer, solid waste), and (4) social services (education, health care, public safety, quality of life). In each section some questions concerning impact are answered, and then questions using sample data and/or regarding one's own community are given for user solution. A summary concludes each section. (YLB)

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A CITIZEN'S HANDBOOK FOR EVALUATING COMMUNITY IMPACTS

by

Lay James Gibson
Marshall A. Worden
Michael S. Solot

Department of Geography and Regional Development
University of Arizona
Tucson, Arizona

in cooperation with

W. Robert Lovan
Community Development Program
Cooperative Extension Service
University of Arizona
Tucson, Arizona

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PREFACE

This handbook seeks to develop local expertise for dealing with major economic impacts in non-metropolitan centers. The authors perceive a gap between the expertise of local leaders involved in the planning process and that knowledge necessary to deal effectively with significant economic change, the type of change characteristic of Arizona's boom and bust tradition. The boom and bust phenomenon is still evident in such Arizona communities as Casa Grande, Safford, and Bisbee which have in recent years either experienced or anticipated growth and decline associated with mining developments. Similarly, energy developments have also contributed to rapid population fluctuations in Page, St. Johns, and Holbrook and Joseph City. Communities with limited resources have had to respond to a myriad of economic, social, and land use problems. Few communities have access to the know-how and manpower necessary to cope with the variety of complex planning problems associated with rapid economic growth or decline. This handbook is designed to help fill this gap.

Conscientious use of this handbook in any community should have two specific results. First, by educating community leaders in the basics of impact analysis, a certain level of planning expertise will be developed at the local level. The process of planning for impacts is a continuous activity that is greatly assisted by having a critical mass of local persons familiar with planning analysis. This handbook is a first step toward generating that critical mass. Second, this more informed local leadership will set off a chain reaction resulting in a higher level of awareness throughout the community. As the whole community increases its understanding of the boom-and-bust cycle, it is less apt to be fearful and more apt to efficiently allocate resources when faced with the prospect of a major economic impact.

When preparing this handbook, the authors had two major objectives in mind. First, to simply ask the right questions and, second, to provide a format that could easily and efficiently yield meaningful answers. The first objective is probably the most important; we want to introduce community leaders to the systematic study of community structure, community growth, and community decline. Few citizens care to become research analysts and that is not necessary if they understand the process of regional evolution well enough to ask the right questions of "experts." Private consultants, university faculty, and state planners can usually be called in to a community to perform technical studies. If local leaders are to get full benefit from these resources, they must know what questions to ask. In short, even if the user of this handbook never puts pen to paper, he or she will be more sensative to the full ramifications of a structural change, better able to direct the energies of professional researchers, and better equipped to evaluate the quality of the outside expert's work.

The handbook also provides the context for community leaders to actually do research "on their own." The user who answers the questions that are asked will produce results describing, at least in general terms, the

level of impact to be anticipated. A good consultant will supply more precise answers and this is as it should be. It would be unrealistic to think that a relatively short handbook could replace an expert who has had years of training and professional experience. It is, however, reasonable to assume that at least the general magnitude of impacts can be evaluated by lay leaders.

More important than the answers produced is that the handbook user, as he goes through the questions, is sharpening his understanding of the complex processes that lead to community impacts. Perhaps the greatest benefit of actually putting pen to paper is that it reinforces the handbook's primary mission--that of identifying the "right questions."

Work on this handbook was partially supported by a grant from the Arizona Commission for Postsecondary Education. Those funds, provided under Title I of the Higher Education Act of 1965, made possible the presentation of various drafts of this handbook in a series of community workshops in Bisbee, Springerville and Eagar, Safford, and St. Johns Arizona. The critical evaluation by and active participation of many local citizens has resulted in the present version. We are most grateful for the opportunity of having worked with and learned from those various community leaders.

INTRODUCTION

Development of a natural resource, energy facilities, any large industry, or a number of smaller developments will result in profound changes for a small community. The tax base will change. The amount of employment in the community will increase because of those jobs directly associated with the new development as well as those which will be created in response to it. Population will grow as newcomers, many with families, move in to fill these new jobs. Finally, this increase in population will require a corresponding increase in public and private services: housing, transportation (roads), water, wastewater, garbage, retail stores, schools, health care, police and fire protection, and recreation facilities (Figure 1). Similarly, a loss of a large employer (such as a mine) will result in a loss of population and reduced demand for services (Figure 2). It is this increased or decreased demand for services that is of greatest concern to community leaders. How much will our population grow? How many new school rooms and teachers will we need? How will our water system have to be expanded? Or conversely, how much excess capacity will we be left with after our population declines? These are the kinds of questions local citizens must face. They need a thorough understanding of the boom-and-bust cycle and the ways in which they can cope with it in order to effectively deal with a major economic impact.

This handbook is designed to help citizens evaluate what the general impacts will be. It is organized in a series of logically ordered planning components. In each section, the user is guided through a set of simple calculations which provide quantitative answers regarding a particular area of impact, such as population, schools, or housing. By proceeding through the handbook, then, the user will gain a good idea of what the economic impact will mean to his community. The reader will learn a great deal about the nature of economic impacts in a general way, how to estimate their magnitude, and how their effects ripple through a small community. Since we are dealing with two kinds of impact, growth and decline, it is necessary to separate them from the beginning. Part A deals with new development and Part B with the loss of a major employer. Both parts are parallel in outline since the same issues must be confronted. No matter what his present situation, the user is encouraged to go through both parts since most communities will eventually experience all stages of the boom-and-bust cycle.

Before community leaders collect and use information on economic impacts, they need an understanding of the tools available to help them in the decision-making process and the relationships between the services and facilities under consideration. The ability of a community to cope with either new development or a major decline depends on the local administrative structure and the degree to which it can: 1) assimilate new functions; 2) evaluate a surge of either expanding or declining activity; 3) seek out and receive federal, state, or more local financial and technical assistance; 4) attach conditions to the impact in order to moderate potential effects; 5) handle a shifting fiscal balance characterized by either necessary expansion of services before new revenues are fully available or, conversely, a drying up of revenues which may outpace the decline of needed

Figure 1.

Figure 2.

services; and 6) plan for either the expenditure of increased revenues within the framework of a capital improvements program or the organization and use of excess capacity once decline has proceeded. The exact needs of a particular community will depend on its point in the development cycle.

In answering the questions of how to go about managing rapid growth or decline, communities must determine what they want to accomplish and create a philosophy about future development. This process might include:

- determination of community goals and objectives
- involvement of citizens in goal-setting and planning
- organization of local government for planning and managing growth or decline
- use of outside assistance and experience of others to aid local decision-making
- coordination with the impacting company

Local community leaders will be concerned with managing the environmental, economic, geographic, and social impacts of large scale growth or decline. They must first take into account the economic and demographic impacts since this information will form the basis for subsequent analyses of environmental, geographic, and social effects. These primary impacts include changes in employment and population and its characteristics. These changes will lead, in turn, to new housing and transportation needs. Environmental services such as water, wastewater, and garbage collection will have to be reassessed as a result of the demographic changes. Finally, levels of social services provided at the local level such as education, police and fire protection, health, and recreation will have to be adjusted.

QUESTIONS

1. Is the anticipated impact going to bring growth or decline? [If the answer is growth, be sure to use Part A. If the answer is decline, use Part B.]

2. Who is in charge of planning for your community?

3. Are local citizens involved in the planning process?

4. What is the name of the impacting company?

5. Is there an official company liaison with the community?

6. Does your community have a master plan?

7. Is there a planning and zoning commission?

8. What citizen's groups (such as the Chamber of Commerce) are involved in community development activities?

PART A: NEW OR EXPANDING DEVELOPMENT

I. ECONOMIC AND DEMOGRAPHIC IMPACTS

This section deals with the basics of new economic growth: the creation of new jobs and the resulting population growth. While a new employer may have regional impacts, this handbook is solely concerned with impacts within a single community or town. The analysis proceeds as follows:

1) Employment
   How many new jobs will the new development directly create? How many jobs will the new development indirectly generate in the town?
2) Population
   How many new people will be added to the town's population during both the short and the long term?

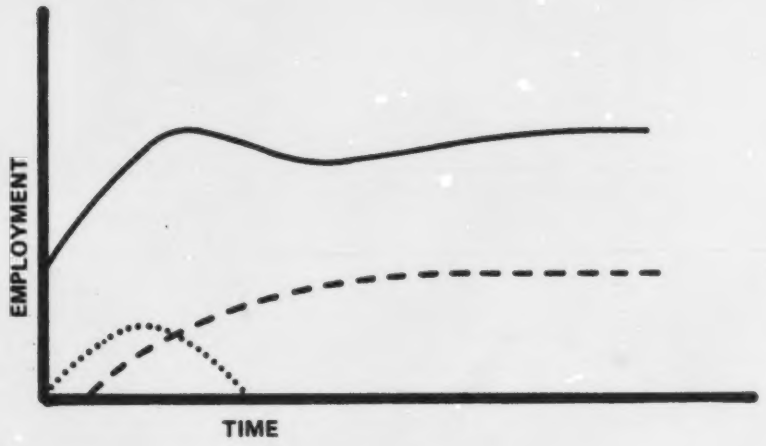
Employment - How many jobs will be created?

The construction and operation of a large, new facility in a small town will have major impacts on its economy and people. These impacts all stem from the new employment created by the new facility. In order to understand these impacts, it is first necessary to distinguish between the two types of jobs created by the development.

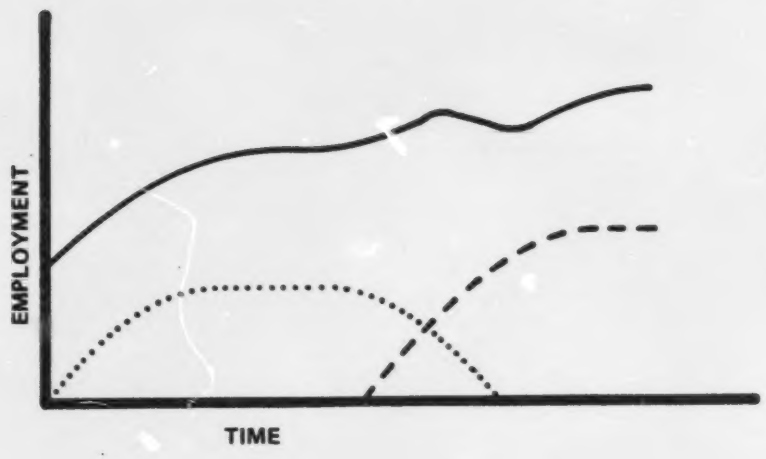
The first we shall call direct employment. These jobs are directly associated with the facility itself, either during its construction or operation. If the proposed facility is a power plant, for example, direct employment includes only those jobs directly involved in either the construction of the plant itself or its operation over the long term.

The second type of employment associated with a new development is called supporting employment. These are jobs which are created in the town to serve the needs of the new population that is brought in to work at the plant. These jobs come about in almost any part of the town's economy; for example, grocery stores, service stations, town government, or banks. This supporting employment involves either the expansion of existing businesses or the creation of new ones.

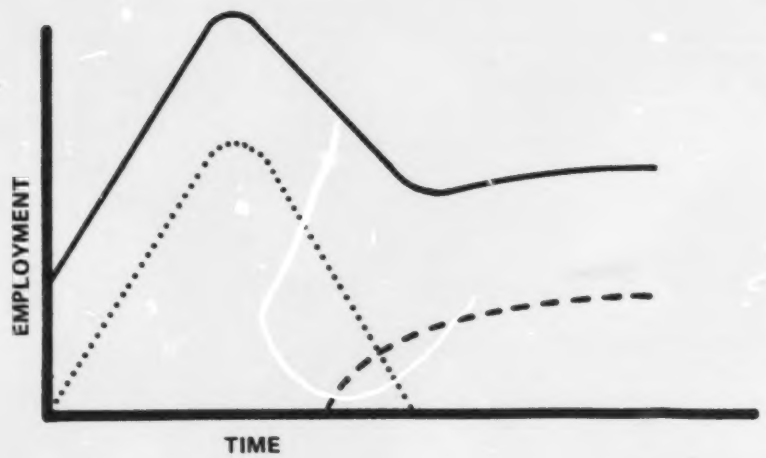
As a town grows, new types of businesses that could not previously be supported will now be able to be supported. Existing business will expand and new competitors may enter the community. For example, a town that for years has been too small to support a new car dealership or a physician may find that it has grown sufficiently to support the offering of such a good as new automobiles or a service such as health care. The exact number of supporting jobs which are likely to be created by a new development are discussed in a later section. For now, it is important to understand that the amount of supporting employment is dependent upon the direct employment created by the new facility. The first step in assessing the impact of new development is to determine the direct employment. These figures can normally be obtained from the developer himself.



A. New Mining Operation



B. New Manufacturing Plant



C. New Power Plant

Total

Operation

Construction

Figure 3.

In most cases there will be a significant difference between direct employment during the construction and operation phases of the development. This difference will vary, of course, depending on the type of facility. Each major type of development has a different relationship between the construction and operation phases and, consequently, a different impact on total employment in the community (Figure 3).

The difference is most critical in the case of the power plant. In that instance, construction employment rises to an early peak at a much higher level than the long-term operating employment (Figure 3C). The community must cope, therefore, with rapid and large impacts before it can deal with the long-term effects. Care must be taken not to overreact to the short-term construction impacts since it is the operating employment which will be most important throughout the life of the facility. As shown in Figures 3A and 3B, the short-term construction impacts in mining and manufacturing are less than those of the long-term operation impacts. Communities faced with these types of developments can confidently plan for the long-term and will be impacted far less during construction.

QUESTIONS

[Answers to these questions should be available from the developer's community liaison officer.]

9. How much direct employment will you have in construction?

10. What will be the full operational employment?

Employment - How many jobs will be local?

Once Questions 9 and 10 are answered, it is necessary to determine what portion of the direct employment will be taken by long-time residents of the community (local hires), by persons who relocate there (relocates), and by persons who commute to the job (Figure 4). This is necessary since it is those jobs held by residents and relocates which will have the greatest impact on the community. Construction workers who commute daily to the site from some distance away will have a very minimal impact on the town. They will have a regional impact, but that is not the focus of this handbook. Workers who relocate to the town during the operation of the facility will have a very great long-term impact.

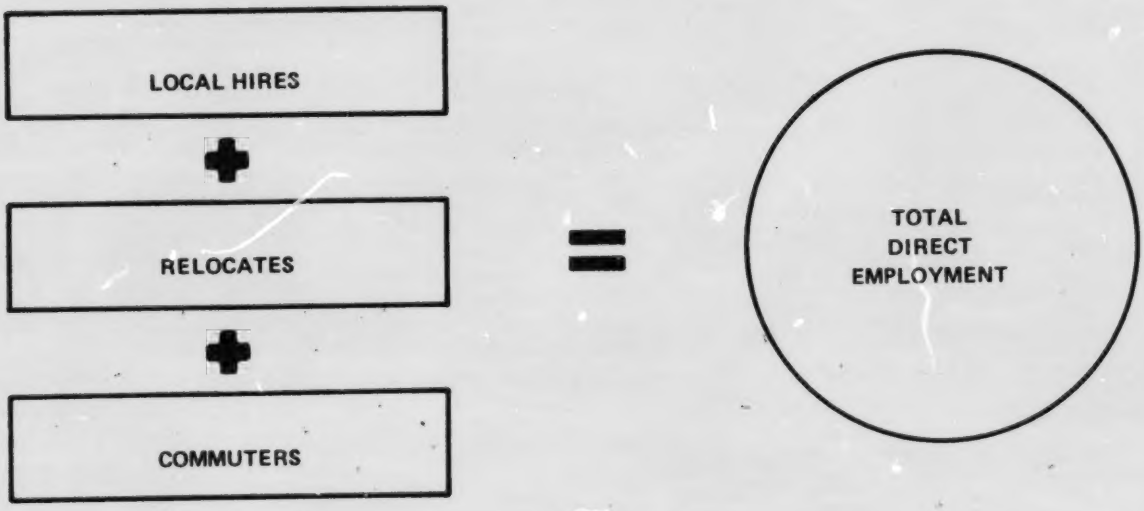


Figure 4.

In general, during construction, there are a large number of daily or weekly commuters who do not bring their families. The amount of local employment during the construction phase is usually small. Approximate figures for the number of daily commuters, weeklies, relocates, and local hires are usually available from the developer. It should be remembered how these numbers change from the construction through the operating phases; the importance of these observations will become apparent when considering population growth.

The number of local hires presents a problem in calculating the impacts of a new development. If these hires come from job switching by those who already have local jobs, the impact will be substantial because their former employer will need to replace them. If these local hires are filled through employment of the previously unemployed and those currently not participating in the labor force such as wives or teen-agers of currently employed persons, their impact will be less than those who relocate to the town with their families. How much of the direct (or supporting) employment will come from these two different sources is hard to say but it is wise to keep it in mind because the answer will help determine the magnitude of impact that can be expected.

QUESTIONS

[Answers to these questions should be available from the developer's community liaison officer.]

11. How much of the direct construction employment will be filled by incommuters (dailies or weeklies)?

12. How much of the direct operation employment will be filled by incommuters (dailies or weeklies)?

13. How much of the construction employment will be filled by relocates?

14. How much of the operation employment will be filled by relocates?

15. How much of the construction employment will be filled by local hires?

16. How much of the operation employment will be filled by local hires?

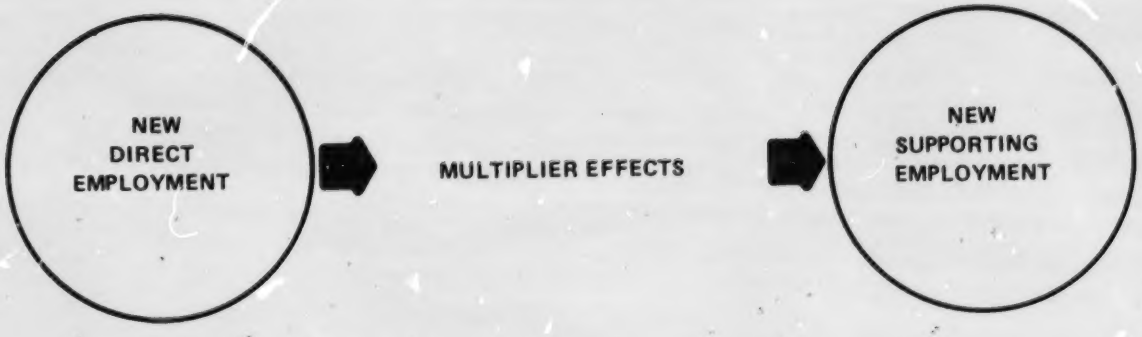

NEW
DIRECT
EMPLOYMENT
MULTIPLIER EFFECTS
NEW
SUPPORTING
EMPLOYMENT

Figure 5.

Employment - How many supporting jobs will be created?

We have already seen the importance of employment directly related to a new development. Now we must consider how that direct employment creates more supporting jobs in your community. In order to do this we must first gain a basic understanding of the economic base concept.

In general terms, the economic base concept assumes that all business transactions are carried on at two scales. If your community is considered as the base area, an intra-community transaction such as a resident of your town purchasing groceries at one of the area's markets would be described as a non-basic transaction since it simply involves the recylcing of money already in the local economy. Non-basic activities are also referred to as supporting activities.

Transactions at the inter-community scale are called basic since they require that money be imported from some point outside the base area. A basic activity might be one which produces some goods or services which are purchased by an outsider, such as a tourist. Or, a basic acitvity might produce a product which is exported outside the base area and thus brings money in. It is in this second way that we consider mining, manufacturing, or a power plant to be basic activities. The money which they bring into the local economy, in the form of paychecks, for example, is the new money which leads to the growth and expansion of business activity within the base area.

The general relationship between basic and non-basic activities is described by the multiplier. The multiplier indicates the amount of increase in total employment that will result from an increase in basic employment. When new basic employees are added to the local economy, expansion through a whole range of non-basic goods and services will be needed to meet the increased demand. More groceries, personal services, and public administration services, for example, will be demanded. In each part of the economy, this new demand will then be translated into new jobs. How many new jobs will be created? The multiplier can give the answer. It is calculated in the following way:

$$\text{Multiplier} = \frac{\text{Total Employment}}{\text{Basic Employment}}$$

By applying the correct multiplier to the expected increase in basic employment, you will get a prediction of the supporting or new service employment (Figure 5). For example, a multiplier of 2.1 tells us that if one basic job is created, 1.1 additional supporting employees will have to be added to the labor force. In other words, each basic employee brings in enough outside money to support 1.1 supporting employees. [1 basic + 1.1 non-basic = 2.1, which is the multiplier.]

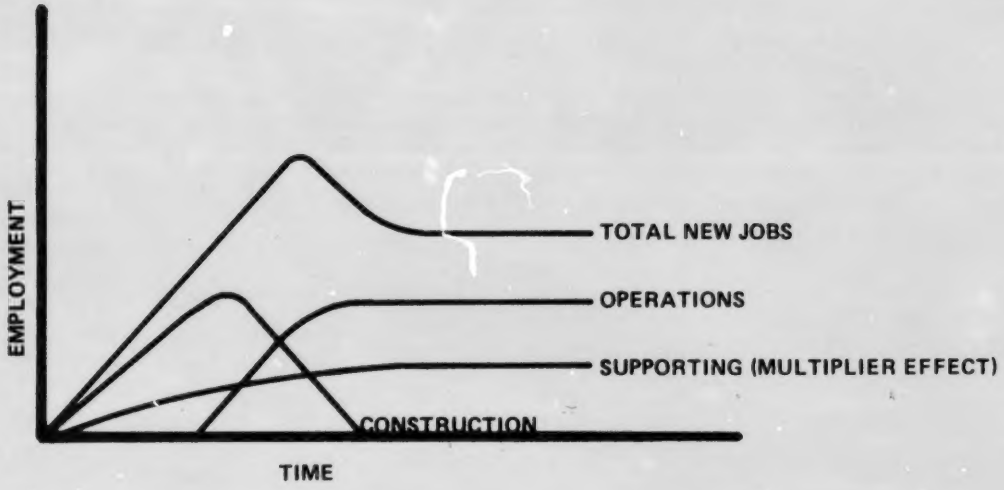

EMPLOYMENT
TOTAL NEW JOBS
OPERATIONS
SUPPORTING (MULTIPLIER EFFECT)
CONSTRUCTION
TIME

Figure 6.

To arrive at a multiplier for your community, look at Tables 1 and 2. Table 1 presents a list of 22 Arizona communities which have been surveyed in the past by the University of Arizona's Department of Geography and Regional Development. As a result of these surveys, multipliers were calculated and later adjusted in order to take into account a number of factors not included in the surveys themselves. If your community is represented on this table, note that value and use it in the calculations which are called for on the following pages. If your community is not represented on Table 1, Table 2 presents multipliers calcualted for 29 population intervals from 500 to 15,000. Choose that value which most nearly represents your town's present size.

Now that you have your town's multiplier, you are prepared to calculate the supporting employment. The direct employment of the new development will be consided as 100% basic. If the new facility in your community is a power plant, direct employment should be broken down into construction and operation since there is such a significant difference between the two phases. The early peak of the construction phase (Figure 3C) will require its own planning strategy. But due to the time lag before the multiplier effect takes hold, it should only be applied to the long-term operating employment.

The full amount of direct operational employment (Questions 10 on page 9) must be adjusted before the multiplier can be applied. You must first subtract from it the number of expected in-commuters (Question 12 on page 11). This adjusted figure of new basic employment can now be used, along with the multiplier, to calculate the total number of new supporting jobs to be created in your town:

(Multiplier - 1) x Adjusted Basic Employment = Total New Supporting Jobs

Many of these new supporting jobs, however, will be filled by members of households whose head is employed in the operation of the plant. For that reason, we need to establish the net number of supporting jobs that will be filled by new households whose members have nothing to do with the operation of the plant. In the questions following this section, therefore, you will go through a series of calculations taking into account the average number of employed persons per household in Arizona (1.20).

The implications of the economic base concept for the present discussion are summarized in Figure 6. The multiplier effect is least significant during the construction phase despite the high number of basic jobs. This is because most of those jobs are likely to be filled by in-commuters or short-term residents. As the operation employees settle in the community, the multiplier effect reaches its maximum; the total number of new jobs in the community remains about the same after the construction peak declines.

TABLE 1

MULTIPLIERS FOR ARIZONA COMMUNITIES

Benson	1.33
Bisbee	1.30
Clifton-Morenci	1.13
Douglas	1.46
Fredonia	1.21
Globe-Miami	1.35
Holbrook-Joseph City	1.46
Lake Havasu City	1.59
Page	1.38
Parker-Parker Strip	1.52
Payson	1.38
Safford-Pima-Thatcher	1.54
St. Johns	1.29
Sedona-Oak Creek Canyon	1.47
Show Low	1.40
Snowflake-Taylor	1.29
Springerville-Eagar-Greer	1.40
Superior	1.13
Verde Valley (Cottonwood, Jerome, Camp Verde, and Clarkdale)	1.52
Wickenburg	1.38
Willcox	1.37
Williams	1.38

Source: By Authors.

TABLE 2

MULTIPLIERS FOR POPULATION INTERVALS

POPULATION	MULTIPLIER
500	1.20
1,000	1.27
1,500	1.31
2,000	1.34
2,500	1.36
3,000	1.38
3,500	1.40
4,000	1.41
4,500	1.43
5,000	1.44
5,500	1.45
6,000	1.46
6,500	1.47
7,000	1.48
7,500	1.49
8,000	1.50
8,500	1.51
9,000	1.52
9,500	1.53
10,000	1.53
10,500	1.54
11,000	1.54
11,500	1.55
12,000	1.56
12,500	1.57
13,000	1.57
13,500	1.58
14,000	1.58
14,500	1.59
15,000	1.59

Source: By Authors.

QUESTIONS

17. What is the multiplier for your town? (See Table 1 on page 16 or Table 2 on page 17).

18. What is the adjusted figure for new basic operational employment? (Question 10 on page 9 minus Question 12 on page 11. If the answer to Question 12 is not known, multiply the answer to Question 10 by 0.85.)

19. What is the total number of new supporting jobs expected for your town? (Subtract 1 from the answer to Question 17 and multiply the result by Question 18.)

20. What is the total number of long-term new jobs created in your community because of the new facility? (Question 18 plus Question 19.)

21. What is the total number of new workers (direct and supporting) in households whose head is directly employed at the new facility? (Multiply Question 18 by 1.20.)

22. What is the net number of new supporting jobs? (Question 20 minus Question 21.)

Population - How much will the town grow?

As Figure 1 on page 3 shows, population growth is directly related to increased employment. Now that the amount of new employment has been determined, we can predict the total population increase for your community. This is perhaps the most crucial part of planning for an impact, since it is population growth which will determine the need for increased public and private services. Several approaches may be used. A local historical relationship between employment and the working age population may be applied to the expected rise in total employment. Actual population impacts in similar situations might be looked at in order to make a prediction. Or, some national norm may be applied. In this discussion, a combination of the last two ideas will be used. Local citizens should be aware that not all workers will choose to settle in the community, especially during construction,

and that their impact will be much lower than those who relocate to the town. Changes in demography, or the characteristics of the people, are also likely to occur and need to be taken into account by local decision-makers.

An example of population growth following large-scale development is shown in Figure 7. As construction employment declines, households of operational personnel begin to come in. It is these operational employees who can sustain the long-term multiplier effects which will add the new supporting population.

Research conducted in towns experiencing growth has yielded the following figures which may be used for population projections:

Construction (short-term) employees
60% will be residents with households of 3.1 people

Operation (long-term) employees
85% will be residents with households of 3.1 people

The remaining percentages are in-commuters, both daily and weekly commuters during the construction phase, and mainly daily during operations. These figures can be used to make approximate estimates of population growth during and following construction of a large facility. If more specific employment data has been supplied by the impacting firm, you will instead want to use that information.

QUESTIONS

23. What will be the population growth attributable to construction employees? (If the answer to Question 11 on page 11 is known, subtract that from Question 9 on page 9 and multiply the result by 3.1. If the answer to Question 11 is not know, multiply the answer to Question 9 by 1.86.)

24. What will be the population growth attributable to operations employees? (Multiply the answer to Question 18 on page 18 by 3.1.)

25. What will be the population growth attributable to supporting employees? (Multiply the answer to Question 22 on page 18 by 3.1.)

26. What will be the total population growth of your town over the long-term? (Add Questions 24 and 25.)

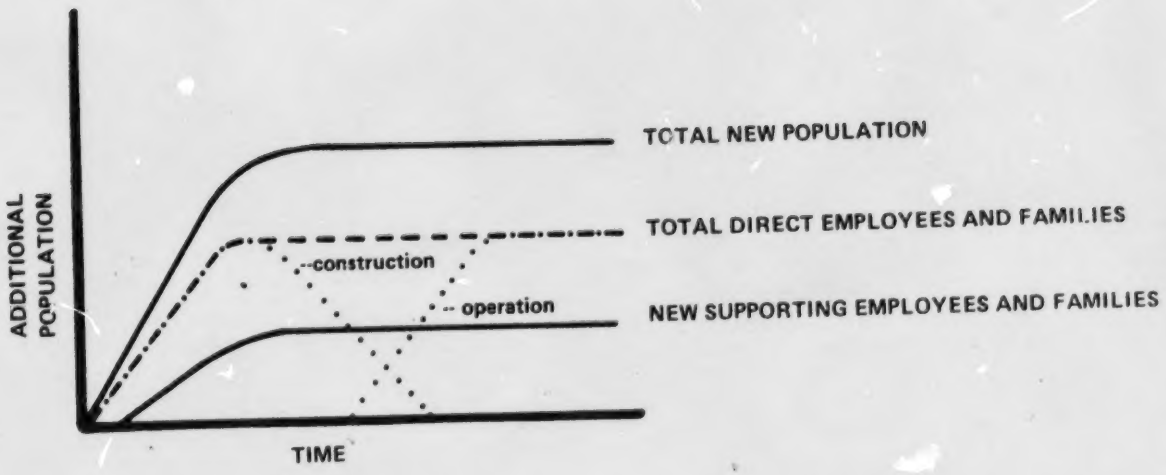

ADDITIONAL POPULATION
TOTAL NEW POPULATION
TOTAL DIRECT EMPLOYEES AND FAMILIES
--construction
-- operation
NEW SUPPORTING EMPLOYEES AND FAMILIES
TIME

Figure 7.

Summary of Section I

In this section we have dealt with the most basic components of any impact analysis: employment and population. The major force behind the impact, direct employment, was shown to have two-phases: a short, intense construction phase followed by a smoother, long-term operating phase. Planning efforts should be focused, it was argued, on the second phase for a number of reasons. First, the direct employment of the construction phase is much more likely to consist of commuters and construction impacts are consequently far less, job for job, than that of the operating phase. Second, the multiplier effect of new basic employment takes a certain amount of time to manifest itself so a strategy of planning for the long-term while coping with the short seems best.

A number of issues were raised which will better prepare local officials and community leaders to effectively plan for a large impact. First, within the framework of the economic base concept, a distinction between basic and non-basic employment was drawn. The new jobs directly created by the new development were called basic. This direct employment was then divided into construction and operation phases (Questions 9 and 10). In order to apply the economic base concept, it was first necessary to discount direct employment by in-commuters (Questions 11 and 12). Then a multiplier for your town was determined (Tables 1 and 2) and that was then applied to the expected direct employment for the operation phase. This yielded a figure for the expected increase in supporting jobs (Question 19). Together with the direct employment, this represented the total expected rise in employment. From these figures population projections were made using an average household size of 3.1 people. Questions 23 through 26 dealt with population growth during both construction and operation.

Now we are prepared to look at specific areas which the population growth will affect. This is the most important goal of any planning effort: to find out what will be the impacts in particular areas such as housing and transportation, environmental services, and social services (Figure 8).

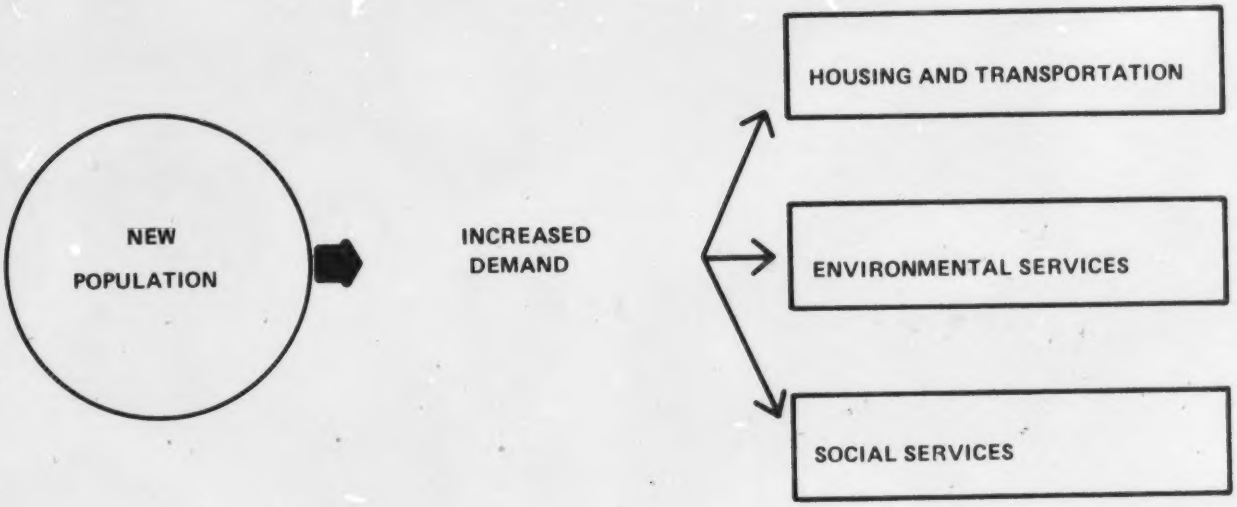

NEW
POPULATION
INCREASED
DEMAND
HOUSING AND TRANSPORTATION
ENVIRONMENTAL SERVICES
SOCIAL SERVICES

Figure 8.

II. HOUSING AND TRANSPORTATION

Housing and transportation problems are often the first sign of the impact of rapid population growth. New employees entering an area will occupy available housing units and the increased demand will have varied effects on the market. Prices will rise, perhaps putting housing beyond the reach of local residents, especially those with fixed incomes. This may be particularly true for the relatively short-term of the construction phase. The influx of skilled workers able to pay higher housing prices may also alter the types of structures available for occupancy.

Development-related transportation impacts should also be of major concern to local citizens. The existing regional transportation system will very likely influence the relocation of employees to your town as well as their commuting patterns. Intensified use by a large number of workers and heavy vehicles can cause swift deterioration of the system and excessive congestion unless planning is undertaken. Flexible solutions should be sought to allow communities to meet short-term peaks without making unnecessarily large investments.

Housing

In order to effectively plan for a large increased demand in housing, local leaders need to first look at the current housing situation. They need to know if the current supply is sufficient or, if there is a gap between demand and supply, how large it is, and finally they need to know if residents are currently living in overcrowded or substandard housing. Only after careful assessment of the current situation has been made can local officials confidently estimate the projected demand for housing.

Research conducted in small towns experiencing rapid population growth related to development of large facilities has yielded the following figures for likely housing preferences of construction, operation, and supporting employees:

Construction (short-term)
- mobile homes 53%
- motels, apartments 30%
- single family units. 17%

Operation (long-term)
- single family units. 54%
- mobile homes 36%
- motels, apartments 10%

Supporting Employees (long-term)
- single family units. 43%
- mobile homes 32%
- motels, apartments 25%

You may, however, have specific estimates of housing types which will accommodate newcomers to your community. For example, if the impacting firm plans to build a subdivision and subsidize the housing, a large share of the newcomers will no doubt live in that subdivision. Similar mitigating measures undertaken by the developer would include, especially during the construction phase, the establishment of a "man-camp" or other temporary housing. If you have no such information, the housing-mix estimates provided above should be used.

Several additional factors will affect the ability of the housing market to absorb new demand. These are historic growth trends in the area, number of housing units, and the ability of the newcomers to pay. From the information available, community decision-makers can best decide how to direct the expansion of housing. Here zoning and housing ordinances will be of most use in locating certain types of housing in the most suitable areas and in areas where the supply of public services will be most feasible.

QUESTIONS

27. What will be the peak demand for mobile homes, motels and apartments, and single family houses during construction? (If the answer to Question 11 on page 11 is known, subtract that from Question 9 on page 9 and multiply the result by the percentages given on page 23. If the answer to Question 11 is not known, first multiply the answer to Question 9 by .60 and then multiply that result by the percentages given on page 23.)

28. What will be the peak demand for mobile homes, motels and apartments, and single family homes by operating employees? (Multiply the answer to Question 18 on page 18 by the percentages given on page 23.)

29. What will be the peak demand for mobile homes, motels and apartments, and single family homes by supporting employees? (Multiply the answer to Question 22 on page 18 by the percentages given on page 23.)

30. What will the total long-term demand for mobile homes, motels and apartments, and single family homes? (Add the answers to Questions 28 and 29.)

Transportation

As with housing, local decision-makers need to look at the current transportation situation before planning for project-related impacts. They need to know what the current level of service is and something about the methods available for traffic control and management.

In planning for increased demand, it is difficult to say exactly how much the present system will have to be increased and in what way. Certainly, those transportation needs directly associated with the new facility need to be taken into account. The community should be wary of making long-term, irreversible capital investments. In addition, all operation and maintenance costs need to be carefully assessed. Methods of reducing the impact of increased use of the system should also be considered. Special travel arrangements such as commuter buses are possible solutions. Staggered shifts, scheduled trucking, and other approaches can reduce the potential for overloading the system.

Local citizens should be aware that population growth associated with a new facility will have both positive and negative effects. More vehicles will probably lead to increased congestion on local streets and, quite possibly, to deterioration of the street surface itself. At the same time, however, increased population could make possible either new modes of transportation service such as air or rail or an expanded level of service on already existing systems.

QUESTION

31. What specific transportation demands will the new project make?

Summary of Section II

In this section, housing and transportation needs have been considered. A general method for projecting housing demand was offered using typical figures for construction, operating, and supporting employees. This method broke down housing demand into demand for mobile homes, motels and apartments, and single family units.

While it was acknowledged that exact transportation needs assessment is difficult, it was suggested that capital improvements be undertaken with caution. Some alternatives to increasing the system and a variety of the potential impacts were identified.

III. ENVIRONMENTAL SERVICES

Environmental service needs are directly linked to population growth. As the population increases due to new development, the community will have to respond with expansion of water, sewer, and solid waste disposal systems. In addition, any special requirements of the new facility will have to be taken into consideration.

Water

Not only will increased demand for services be a concern, but a certain level of quality must also be maintained. In order to plan effectively for an expansion of the system, evaluation of the current situation is needed first. What is the current demand? What is the current source? Are other sources available? What are the key characteristics of the current supply (pressure, quality, flow, and storage capacity)?

The basic data needed for projecting demand is population, although social and economic characteristics of the population may have a bearing on consumption as well. Past trends in your community may be used to predict future demand based on population projections. Or a national average may be used:

Daily Water Use (gallons per capita)

Domestic	60
Industrial	62
Public	25
Total	147

To estimate the long-term increased demand for water in your town, multiply these figures times the projected population growth. You should also take into account any special problems (such as contamination or water table lowering) presented by the new facility. If the impacting project uses or purchases town water, there will be direct impact in addition to the indirect and induced impacts considered below.

QUESTIONS

32. What is the projected long-term increase in daily demand for water? (Multiply the answer to Question 26 on page 19 by 147 gallons.)

33. What is the present daily demand for water? (Ask your Public Works Director or the equivalent town official.)

34. What is the present maximum daily production capability of your town's water system? (Ask your Public Works Director.)

35. What is the unused capacity of your current water system? (Subtract Question 33 from Question 34.)

36. What additional population could be supported by the current water system? (Divide Question 35 by 147.)

37. For how many additional people must the system be expanded? (Subtract Question 36 from Question 26 on page 19. If the answer to Question 36 is greater than the answer to Question 26, you will not have to expand your system and should not do this calculation.)

Sewer

An increase in population and changes in waste generation and water consumption brought about by the development of a large industry will create a demand for new sewage treatment capabilities. Federal standards will have to be met. Many of the solutions available are expensive and permanent and, therefore, they are not suitable for meeting the significant although short-lived need during the construction phase. In addition, the substantial lead-time required to develop new sewage treatment facilities makes their construction possible for the long-term only. Your community will have to develop two solutions: one for immediate construction related impacts and another for long-term development.

As with projection of water needs, the first step in planning for expansion of the sewer system is to evaluate the current situation. What is the capacity? How much can it be expanded? What are the alternative systems available? Environmental considerations will come into play as well, such as the ability of the land to absorb the increased effluents.

To determine wastewater flow, you will have to use the projection of increased demand for water arrived at in the last section. The general rule is that 60% to 70% of total water supplied eventually becomes wastewater. Long-term management implications of various sewage-treatment alternatives should be considered early in the decision-making process. Your system should be developed in phases so it expands with the population.

QUESTIONS

38. What will be the increased daily load on wastewater treatment? (Multiply Question 32 on page 27 by 0.70.)

39. What is the present daily demand for wastewater treatment? (Ask your Public Works Director.)

40. What is the present maximum capacity of your wastewater treatment facility? (Ask your Public Works Director.)

41. What is the unused capacity of your current wastewater treatment facility? (Subtract Question 39 from Question 40.)

42. How much of the anticipated increase in wastewater will have to be met through an expanded or alternative facility? (Subtract Question 41 from Question 38. If the answer to Question 41 is greater than the answer to Question 38, you will not have to expand your system and should not do this calculation.)

Solid Waste Disposal

The development of new industry will change the amount, rate of generation, and type of solid waste produced in your community. Residential density may increase, and the service area may also increase. These and other changes will require different or expanded services.

In evaluating the current system, several questions need to be examined. What are the present collection methods? What is the storage capacity? Are landfill areas available? Are private firms available to provide this service?

Communities need to develop an overall plan for dealing with solid waste. Sanitary landfills represent the major community alternative to open dumps although incineration and composting may be considered. The total housing and transportation picture needs to be taken into account as well as applicable federal and state regulations.

Summary of Section III

Environmental services will need to be expanded as population grows. For each system, water, sewer, and solid waste, the first step in planning expansion is the evaluation of the current situation: its capacity, ability to

expand, and level of service. Methods for projecting increased demand for water and wastewater services were put forth. It was suggested throughout that the best strategy is to plan for the long-term while coping with the short.

IV. SOCIAL SERVICES

There is a whole range of social services which will be affected by major economic development. The increase in population will lead directly to an increased demand for education, health care, public safety, and recreation. In addition, changes in the town's demography (characteristics of the population) may in itself require an adjustment in the level of social services. These are areas of most immediate, personal concern to the townspeople and deserve careful consideration by those involved in the planning process.

Education

A swift, large influx of school-age children is one of the first impacts associated with a rise in direct employment. Only careful planning can keep schools from feeling a crunch as the construction employment peaks out. Parents are likely to voice as much concern over this as over any issue. Local citizens need to be aware, then, that educational impacts are determined by three major factors: 1) number of school-age children entering the area, 2) their educational needs, and 3) the capacity of the area's schools. Adjustments in the current system may have to be made in the form of increased staffing, additional facilities, and alteration of programs, curriculum, or teaching techniques.

Research conducted in towns experiencing the type of rapid population growth which we are addressing has indicated that incoming employees, both short and long-term, bring with them an average of 0.8 school children. By multiplying this figure times the number of incoming operational and supporting employees, an estimation of the maximum number of incoming school-age children can be obtained. To the resulting figure may be applied either an accepted student/teacher ratio of 24 to 1 or the historical ratio for your town. The number of new teachers and classrooms needed to meet the demand can then be determined. These figures, however, will be an overestimation of teacher needs if your schools are currently operating below capacity. Not included in these figures is the expanded need for non-teaching certified personnel and non-certified employees.

A major consideration is the level of educational services to be offered. Once you are able to project what the enrollment impacts on the educational system will be (both over the short-term and the long-term) you can make the proper decisions regarding the expansion of services. It should be remembered also that the financial capabilities of the community, community concern about education, and the amount of funds available will all play a part in the decision making.

QUESTIONS

43. What is the projected long-term increase in the number of school-age children? (Add Questions 18 and 22 on page 18 and multiply the result by 0.8.)

44. What will be the increased need for teachers in your community's schools? (Divide the answer to Question 43 by 24.)

Health Care

The demand for and quality of health care depends on the social and economic characteristics of the population, the availability of medical and dental services, nursing homes, and a whole series of special services. As the population grows, the facilities and services must expand to meet its needs. The community may also need to expand its emergency and certain special services during project construction.

Demand for mental health services may increase out of proportion to the rest due to the influx of new residents with no established roots and unemployed family members. Special services dealing with alcoholism and drug abuse may be needed.

In a real sense, however, the expansion of health care services is more of a region-wide concern than a purely local one. No small town can be expected to provide the full range of medical services of a larger city. Facilities and personnel concentrated in the regional center will have to share a part of the burden imposed by new development in a smaller town. As a general guide, however, a national figure of 3.5 hospital beds per 1,000 population may be used to estimate the increased demand created by the new population. Local officials need to be sure that this increased demand can be met somewhere within the region.

Of more immediate interest will be the necessary expansion of special health care services. The key to this question is in the characteristics of the new population. Single men have different needs than young families. There may be a problem in meeting the short-term construction demand. Cooperation with the developer could make more regional services available at this time. If you project a long-term need for more health facilities, you should consider developing clinics, hospitals, and office space in order to attract more medical professionals.

While population growth may bring new health care responsibilities and needs, there are also positive benefits that may result. In particular, increased population may now make possible the addition or expansion of facilities and personnel for which there was insufficient demand previously. For example, it may now be possible to establish a hospital, or to add one or more primary care physicians, or to add medical specialists.

QUESTIONS

45. What is the projected new long-term demand for hospital beds? (Divide Question 26 on page 19 by 1000 and multiply the result by 3.5.)

46. What new demands for special health services will be created and what new or expanded services might be able to be supported because of the new population growth?

Public Safety

Police and fire protection needs are based on population characteristics. With the development of a large industrial facility in your town levels of service will have to be adjusted. The increase in population will have an impact as will the location of new residences, which may change response time patterns. Many times the development site itself will be outside the existing service area. Police and fire personnel may need more time to respond to new developments, thus affecting the entire community. An increase in traffic flow is another effect of the population growth which will require attention by public safety personnel.

Local decision-makers need to be aware of special safety services demanded by the project itself. These might include special consideration of fire hazards and crime. The safety demands of the incoming employees are based mainly on the location and type of housing they select. Housing development should be directed through zoning ordinances in such a way that the additional burden on public safety is minimized.

In order to determine how the public safety requirements of your community will change following population growth it will be necessary to get an understanding of the capacity of the current systems. Discussions with police, sheriff, and fire administrators will reveal how much more of a burden can be placed on existing services before additions are required. These administrators will also be able to tell you how their services may best be expanded to protect the growing population. Perhaps a reasonable

guide to projecting increased manpower needs is the historical ratio for your town. This is the estimation method used below. As population begins to expand, you will want to maintain at least this ratio of police officers and firemen to population.

QUESTIONS

47. What is the current number of uniformed police officers in your community? (Ask your Chief of Police or equivalent administrator.)

48. What is the current ratio of population to police officer? (Divide current population by the answer to Question 47.)

49. What is the expected new demand for police officers? (Divide the answer to Question 26 on page 19 by the answer to Question 48.)

50. What is the current number of firemen in your community? (Ask your Fire Chief or equivalent administrator.)

51. What is the current ratio of population to fireman? (Divide current population by the answer to Question 50.)

52. What is the expected new demand for firemen? (Divide the answer to Question 26 on page 19 by the answer to Question 51.)

Recreation

Population expansion and changes in the demography of a small community, such as an increase in the number of young children, will change the recreational needs. Prior to population growth an inventory of recreational facilities should be made. Are existing facilities sufficient to meet current demands? What sorts of facilities are needed? What regional (for example National Parks or Forests) recreational opportunities are available?

In planning for an increased demand for recreational services, community planners should realize that incoming employees may have different needs (due to marital status, family size, or ethnicity) than established residents. The needs of all have to be considered in any long-range plan. It

should be remembered that recreation is not the responsibility of the public sector alone. The private sector can come forth with new recreational schemes and the developer himself may provide certain facilities for the influx of employees. The developer, for instance, may have a well-organized team sports program. All these possibilities should be taken into account by local citizens.

QUESTION

53. What will be the new recreational demands of your community as it grows? How can they best be met?

Quality of Life

One final consideration which lies outside the areas of impact already discussed is the changes in your community's quality of life. The influx of numbers of people and the attendant construction of new homes, mobile home parks, roads, and recreational and shopping facilities will change the landscape of your community significantly. It may mean the modification of the small-town lifestyle to which long-time residents are accustomed. Noise and pollution levels may increase, traffic may become more congested, church membership may change, and the general pace of your town may speed up. These and other changes will result from not only the numerical increase in population, but a qualitative change in demography as well; the type of people living in your town may change in terms of family size, marital status, ethnicity, religion, and socio-economic position. These changes in the quality of life of your town are not really measurable in the sense that we have measured changes in employment, population, and services. They are nonetheless important and merit careful consideration by community leaders since it is sometimes these unmeasurable impacts which are of most concern to long-time residents. It should be remembered throughout the process of development that changes in the quality of life are not always bad and can lead to a social revitalization of the community through the injection of new ideas and new blood.

Summary of Section IV

In this section we have looked at a range of social services that will be affected by the impacting project. Educational services will have to face quick and possibly severe impacts. A method for projecting the increase of school-age children and teacher needs was suggested. Health care needs were discussed in a broader context since the region will have to bear a large share of the increased burden. Local officials need to be mindful of any special services that the new population will require. Public safety will also be affected greatly be new development. It was suggested that

the physical growth of your town be managed in such a way as to moderate the increased burden on public safety personnel and to minimize the increase in response time. Finally, the probable increase in demand for recreational facilities was looked at. It was suggested that in this area changes in the demography of your town's population will be as significant as its increase.

CONCLUSION

What we have attempted throughout Part A of this handbook is to give local community leaders a proper perspective from which to view the impact of a single large project or a series of smaller projects near their town. The goal has been to bring about a certain level of awareness of the kinds of problems a community must face in this situation. We have not attempted to provide definitive answers, the type of precise answers which professional consultants can offer. Rather, we have tried to make the user of this handbook aware of the basic dynamics of the impact process so that he will be able to ask the proper, knowledgeable questions. At the same time, by working through the handbook the user has arrived at estimates of the impact of the project on several areas within his community; housing and transportation, environmental services, and social services. Finally, it is hoped that aided by an increased awareness of the impact process and these estimates of impacts on various areas, community leaders and the community as a whole will be less fearful when faced with imminent, large-scale development and will be able to better direct the growth of their town in the way they want to see it grow.

The most important thing that we have tried to do is to put the impact process into a logical sequence. We have also tried to give the concerned citizen the tools to do at least a preliminary quantitative analysis of the magnitude of anticipatable impacts.

PART B: MAJOR LOSS OF EMPLOYMENT

I. Economic and Demographic Impacts

This section deals with the basics of the loss of a major employer: the loss of jobs and the resulting population decline. While the loss of a major employer may have regional impact, this handbook is solely concerned with impacts within a single community. These are the first issues which must be faced by local citizens. The analysis proceeds as follows:

1) Employment
   - How many jobs will be directly lost by closure or slowdown of the facility?
   - How many jobs will be indirectly lost in the town?
2) Population
   - How will the town's population decrease over time?

Employment - How many jobs will be lost?

The loss of a major employer in a small community will have major impacts on the economy and people of the town. These impacts all stem from the jobs directly lost as a result of the closure of a major employer or significant permanent decline in production. In order to understand these impacts, it is first necessary to distinguish between two types of jobs which will be lost as a result of decline.

The first is called direct employment. These jobs are directly associated with the facility itself. If it is a mine, for example, direct employment includes only those jobs directly involved with the extraction or processing of the minerals; in other words, all those employed by the mine.

The second type of employment is called supporting employment. These are jobs in your community which provide for the needs of the households of employees. Supporting employment can be found in almost any part of the town's economy: grocery stores, service stations, or banks. As the number of direct jobs decreases, therefore, the number of supporting jobs will have to decline as well. The exact number of jobs which are likely to be lost in this way will be discussed in a later section. For now, it is important to understand that the number of supporting jobs is dependent on the direct employment of the facility. The first step in assessing the impact of a major economic decline is to determine the loss in direct employment. These figures can normally be obtained from the employer himself.

In most cases of a major decline in employment, the full economic effects of decline will not be felt for some time, perhaps years. This is due to a number of reasons. First, the employer himself, barring a major catastrophe, will probably reduce his payroll gradually rather than letting go hundreds of employees at a time. He may decide to pace layoffs at a low level and let the normal attrition of employees take care of the rest over time. So a sudden, catastrophic loss may never occur. Second, some

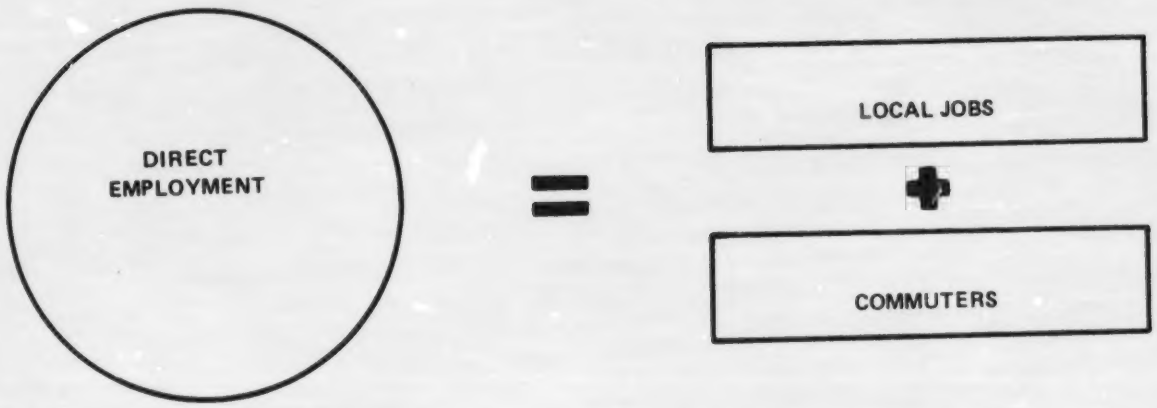


Figure 9.

of those who retire and thereby further this process of attrition may elect to remain in town to live off their pensions, social security, and other transfer payments. Thus, at a reduced level, they will still participate in the town's economy. Third, some of those actually laid-off are likely to remain in town, especially if they have families. They may be able to live off unemployment insurance and other forms of public assistance for some time. In addition, employment of other members of their households can extend their period of continued residence in your town for a long time. All these factors taken together mean that the loss of a major employer or a significant slowdown will not necessarily be an immediate catastrophe. These mitigating or softening effects tend to spread the decline over a period of years.

In order to estimate the long-term effects of economic decline, it is necessary to take into account these mitigating influences. As you plan for a decline in your community's population, you should realize that it will not happen all at once but will be spread over a period of years. As a result, the decline in demand for housing and transportation needs as well as environmental and social services will also be spread over the years.

QUESTIONS

[Answers to these questions should be available from the firm's community liaison officer.]

54. How many direct jobs will be lost?

55. How will this decline be spread over time?

Employment - How many jobs are local?

Once Questions 54 and 55 have been answered it is necessary to determine what portion of the employment loss will be local (Figure 9.) This is necessary since it is the loss of these local jobs which has the greatest impact on the town. Employees who commute daily from, say, 30 to 50 miles away have minimal impact on the town's economy, while those who reside in the community have a very great impact. It is the loss of these latter employees which most concerns us here. Approximate figures for the number of local employees and the number of in-commuters are normally available from the employer. Once the number of in-commuting employees is subtracted from the total number of jobs to be lost a working figure for the number of impacting employees can be obtained.

LOSS OF
DIRECT
EMPLOYMENT
MULTIPLIER EFFECTS
LOSS OF
SUPPORTING
EMPLOYMENT

Figure 10.

QUESTIONS

[Answers to these questions should be available from the firm's community liaison officer.]

56. How many of the direct jobs to be lost are filled by local residents?

57. How many of the direct jobs to be lost are filled by in-commuters?

Employment - How many supporting jobs will be lost?

We have already seen the importance of employment directly related to the facility itself. Now we must consider how the loss of that direct employment creates, in turn, the loss of some supporting employment in your community. In order to do this we must first gain a basic understanding of the economic base concept.

In general terms, the economic base concept assumes that all business transactions are carried on at two scales. If your community is considered as the base area, an intra-community transaction such as a resident of your town purchasing groceries at one of the area's markets would be described as a non-basic transaction since it simply involves the recycling of money already in the local economy. Non-basic activities are also referred to as supporting activities.

Transactions at the inter-community scale are called basic since they require that money be imported from some point outside the base area. A basic activity might be one which produces some goods or services which are purchased by an outsider, such as a tourist. Or, a basic activity might produce a product which is exported outside the base area and thus brings money in. It is in this second way that we consider mining or manufacturing as basic activities. The money which they import into the local economy, in the form of paychecks, for example, is the new money which leads to the growth and expansion of business activity within the base area. Conversely, when this imported money flow stops or slows down, non-basic businesses and their supporting employment must suffer as a result.

The general relationship between basic and non-basic activities is described by the multiplier. The multiplier indicates how much supporting employment exists because of direct employment in basic activities. When basic employees are removed from the local economy, the number of supporting employees providing a whole range of goods and services must also decline in response to the reduced demand (Figure 10). Less groceries, personal services,

and public administrative services will be demanded, for example, when a major basic employer reduces its number of employees. In each part of the economy this reduced demand will be translated into fewer jobs. How many supporting jobs will be lost? The multiplier can give a partial answer. It is calculated in the following way:

$$\text{Multiplier} = \frac{\text{Total Employment}}{\text{Basic Employment}}$$

By applying the correct multiplier to the expected decrease in basic employment, you will be able to predict the loss of supporting or non-basic employment. For example, a multiplier of 2.1 tells us that one basic employee brings in enough outside money to support 1.1 non-basic or supporting employees. If that basic job is lost, so will the 1.1 supporting jobs be lost. [1 basic + 1.1 non-basic = 2.1, which is the multiplier.]

To arrive at a multiplier for your community, look at Tables 1 and 2 on pages 16 and 17 . Table 1 presents a list of 22 Arizona communities which have been surveyed in the past by the University of Arizona's Department of Geography and Regional Development. As one result of these surveys, multipliers were calculated and later adjusted in order to take into account a number of factors not included in the surveys themselves. If your community is represented on this table, note that value and use it in the calculations which are called for below. If your community is not represented on Table 1, Table 2 presents multipliers calculated for 29 population intervals from 500 to 15,000. Choose that value which most nearly represents your town's present size.

Now that you have your town's multiplier you are prepared to predict the impact of a loss of direct employment on supporting jobs in your community. The direct employment of the impacting facility will be considered as 100% basic. Some of these employees live outside your community and so they were removed from the impact process in the last section. The number of full-impact employees is what concerns us here. This adjusted figure of direct employment, along with your town's multiplier, can be used to predict the loss of supporting employment as follows:

(Multiplier - 1) x Loss of Basic Employment = Total Supporting Employment Lost

This procedure will underestimate the actual loss in supporting employment. The reason for this is that as population declines certain business activities will be lost in their entirity and those businesses will not simply loose some part of their employment. These particular firms require a minimum population in order to maintain operation. If the town's population drops below that minimum or threshold population, all employment will be lost and not just the amount of loss dictated by the multiplier. On the other hand, local citizens should note that some economic sectors may continue to grow and thus offset some of the overall loss. For instance,

tourism may suddenly enjoy a revitalization or the retirement community may expand and these would represent an economic plus. At the same time, however, the wage rates and economic benefits of these expanding sectors will probably not be as good as the declining basic employer. The user of this handbook will want to keep these facts in mind.

Many of the supporting jobs to be lost are held by members of households whose head is employed in the operation of the plant. For that reason, we need to establish the net number of supporting jobs to be lost that are held by members of households who have nothing to do with the operation of the plant. In the questions following this section, therefore, you will go through a series of calculations taking into account the average number of employed persons per household in your community. Table 3 presents this information for selected Arizona communities. If your community is represented on Table 3, note that value for use in the calculations required below. If your community is not represented on Table 3, Table 4 presents the same information for the Arizona counties and the data for your county should be used below.

The implications of the economic base concept for the present discussion are summarized in Figure 11. As the graph shows, there is a time lag between the first decline in direct employment and the first loss of supporting jobs. This is because the non-basic or supporting sector of the economy requires a certain amount of time to adjust to decreased demand.

QUESTIONS

58. What is the multiplier for your town? (See Table 1 on page 16 or Table 2 on page 17.)

59. What is the total number of supporting jobs that will be lost? (Subtract 1 from the answer to Question 58 and multiply the result by Question 56 on page 43.)

60. What is the total number of jobs (direct and supporting) to be lost in your community? (Add Question 56 on page 43 to Question 59.)

61 What is the average number of employed persons per household in your town? (See Table 3 on page 47 or Table 4 on page 48.)

62. What is the net number of supporting jobs to be lost that are held by members of households that are not associated with the impacting facility? (Divide the answer to Question 60 by Question 61; then subtract from that result the answer to Question 56 on page 43.)

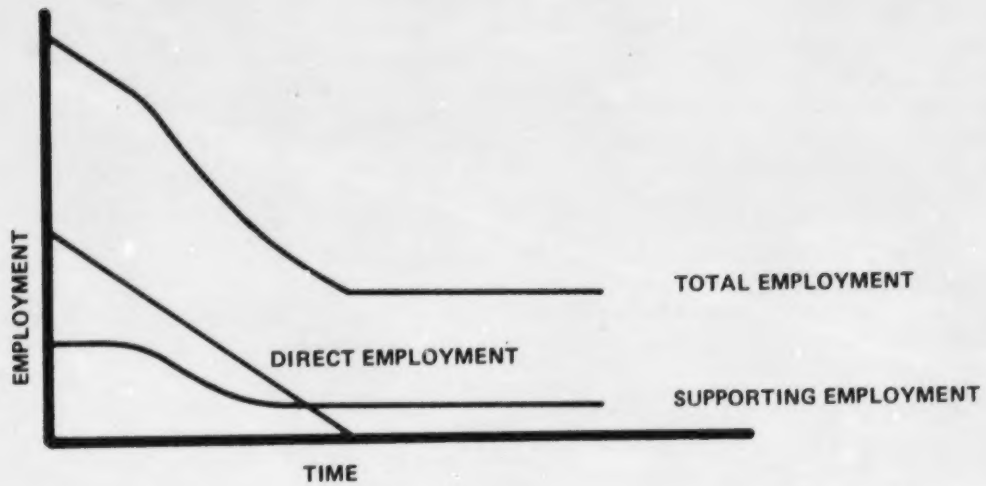

EMPLOYMENT
TOTAL EMPLOYMENT
DIRECT EMPLOYMENT
SUPPORTING EMPLOYMENT
TIME

Figure 11.

TABLE 3

NUMBER OF EMPLOYED PERSONS PER HOUSEHOLD FOR ARIZONA COMMUNITIES

Ajo	1.14
Benson	.96
Buckeye	1.14
Bisbee	1.04
Casa Grande	1.25
Clifton	1.20
Coolidge	1.10
Cottonwood	.89
Douglas	1.00
Eloy	1.17
Flagstaff	1.46
Globe	1.06
Holbrook	1.27
Kearny	1.44
Kingman	1.20
Miami	1.07
Nogales	1.14
Prescott	.92
Safford	1.12
San Carlos	.89
San Manuel	1.33
Sierra Vista	1.16
Superior	1.07
Wickenburg	.84
Willcox	1.43

Source: Bureau of the Census, 1970 Census of Population, Vol 1, Part 4, Tables 104 and 107; and 1970 Census of Housing, Vol. 1, Part 4, Tables 18 and 23.

TABLE 4

NUMBER OF EMPLOYED PERSONS PER HOUSEHOLD FOR ARIZONA COUNTIES AND THE STATE

Apache	.92
Cochise	.99
Coconino	1.27
Gila	1.06
Graham	1.12
Greenlee	1.16
Maricopa	1.20
Mohave	1.03
Navajo	1.05
Pima	1.06
Pinal	1.12
Santa Cruz	1.16
Yavapai	.92
Yuma	1.12
Arizona	1.20

Source: Bureau of Census, 1970 Census of Population, Vol. 1, Part 4, Tables 46 and 121; and 1970 Census of Housing, Vol. 1, Part 4, Tables 2 and 60.

Population - How much population will the town lose?

As Figure 2 on page 3 shows, population decline is directly related to a decrease in employment. Now that the loss of employment has been determined, we can predict the total population decrease for your community. This is perhaps the most crucial part of planning for an impact since it is the projected population loss which will determine the decreased need for public and private services. Several approaches may be used. A local historical relationship between employment and the working-age population may be applied to the expected decrease in total employment. Actual population impacts of communities in similar situations might be looked at in order to make a prediction. Or, some national norm may be applied. In this discussion, a combination of the last two ideas will be used. Local citizens need to be aware that this is a process of gradual population loss, spread over a period of years, and that the figures obtained at this point will be an estimation of the situation at the end of this process. Additionally, local decision-makers need to understand that not only will the absolute number of people in the community fall, but that there are likely to be changes in the demography of the town as well. That is, the characteristics of the population such as age, marital status, ethnicity, and family size are likely be altered.

An example of population decline following the loss of a large number of basic jobs is provided in Figure 12. As is shown, there is a short time lag between the first decline in direct employees and the time when supporting population is lost. The total loss of population is gradual at first and eventually levels off. It cannot be overemphasized, however, that this population loss will be spread over a period of time and will not occur all at once. Planning for decline should be undertaken with that knowledge in mind.

Research conducted in towns which have experienced this type of decline has yielded the figure of 3.1 persons for an average family size. To this figure may be applied the number of impacting direct employees that will be lost and the net number of supporting employees that will be lost.

QUESTIONS

63. What will be the population decline attributable to the loss of direct employees and their families? (Multiply the answer to Question 56 on page 43 by 3.1.)

64. What will be the decline attributable to the loss of supporting employees and their families? (Multiply the answer to Question 62 on page 45 by 3.1.)

65. What will be the total population decline in your town? (Add the answers to Questions 63 and 64.)

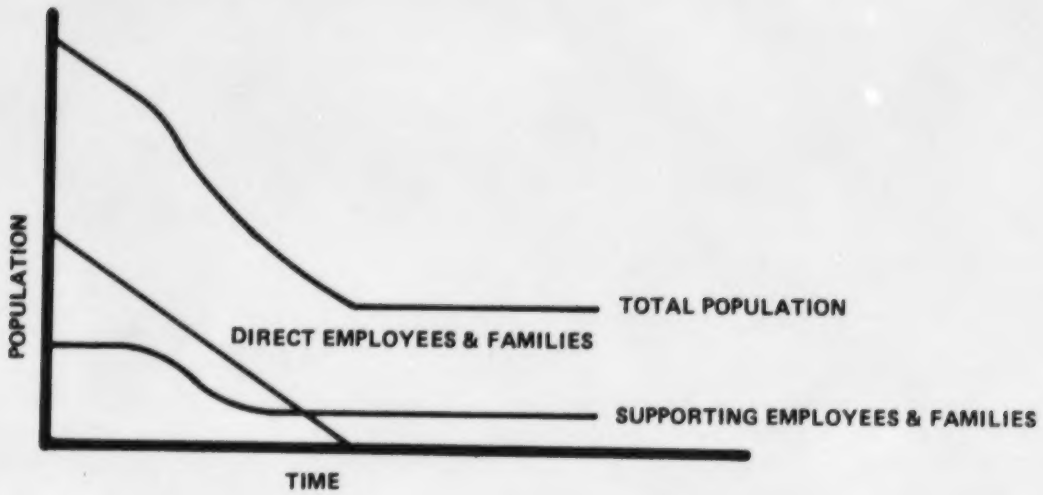

POPULATION
TOTAL POPULATION
DIRECT EMPLOYEES & FAMILIES
SUPPORTING EMPLOYEES & FAMILIES
TIME

Figure 12.

Summary of Section I

In this section we have dealt with the most essential aspects of impact analysis: employment and population. The major force behind the impact was shown to be direct employment. As this declines, the supporting employment associated with it was also shown to decline. How much supporting employment would be lost is described by the multiplier. The multiplier effect was explained in the context of the economic base concept. This loss of direct and supporting jobs was then applied to an average household size to estimate the population decline. It was emphasized throughout that this process of population decline is not an all-at-once phenomenon. Rather, it is spread over a period of years. Also there will likely be some mitigating factors such as employees deciding to stay or retire in the community and other economic sectors experiencing growth.

Now we are prepared to look at specific areas which this population decline will affect. The most important goal of any planning effort is to find out what will occur in specific areas of impact: housing, transportation, environmental services, and social services (Figure 13.)

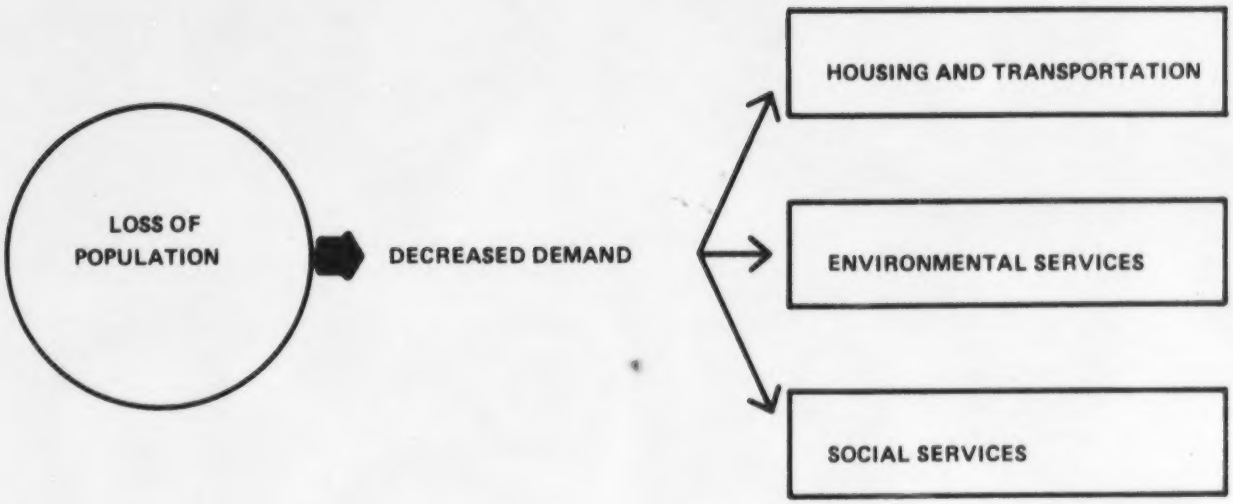

LOSS OF
POPULATION
DECREASED DEMAND
HOUSING AND TRANSPORTATION
ENVIRONMENTAL SERVICES
SOCIAL SERVICES

Figure 13.

II. HOUSING AND TRANSPORTATION

This section aims to give local citizens an idea of how the community's housing situation will be affected and how they might deal with changes in their community's transportation needs. These are both areas of impact in which the decline in the number of employees will have a gradual, yet cumulative and important effect on the town.

Housing

In order to effectively plan for decreased demand in housing, local citizens need to first examine the current housing picture. They will need to know if the current supply is already surpassing demand and, if so, by how much. And they will want to find out if residents are living in overcrowded or substandard housing at present. Only after a careful assessment of the current situation has been made can local persons confidently answer the questions at the end of this section in order to estimate the future demand for housing.

If specific information about the type of housing occupied by those who have lost a job is known, you will want to use that data. Otherwise, use the figures given in Tables 5 or 6. These tables report the percentage of single family units, mobile homes, and apartments in selected Arizona communities and all counties. If your community is not represented in Table 5, use the appropriate county figure given in Table 6. These percentages can be multiplied by the number of households of direct and supporting employees who are leaving your community. This will give you an idea of how much and what types of housing are likely to be vacated during the process of decline.

It should be remembered, however, that there may be certain measures which the impacting company itself has taken which can mitigate, or soften, the effects of decline in this area. These would include the provision of company housing for families or a man-camp for individuals. The vacancies created in these types of housing will have little effect on the local housing situation. Citizens should also be aware of how a reduced density of population may affect their town. Provision of certain social services (especially emergency health and safety services) may be affected.

From the information available, community leaders can best decide how to direct the future of the housing situation. Here zoning and housing ordinances will be of most use in trying to maintain a cohesive community while coping with an economic decline.

TABLE 5

HOUSING STOCK DATA FOR ARIZONA COMMUNITIES

(in percents)

	Single Family Units	Apartments	Mobile Units
Ajo	83	15	2
Benson	72	10	18
Bisbee	88	11	1
Buckeye	75	18	7
Casa Grande	79	12	9
Clifton	84	7	9
Coolidge	90	8	2
Cottonwood	78	5	17
Douglas	76	22	2
Eloy	85	12	3
Flagstaff	61	30	9
Globe	79	17	4
Holbrook	73	15	12
Kearny	83	8	9
Kingman	85	11	4
Miami	85	12	3
Nogales	70	27	3
Prescott	74	19	7
Safford	93	5	2
San Carlos	90	5	5
San Manuel	98	2	0
Sierra Vista	72	12	16
Superior	88	5	7
Wickenburg	68	12	20
Willcox	87	10	3
Williams	97	3	0

Source: Bureau of the Census, 1970 Census of Housing, Vol. 1, Part 4 Tables 2 and 62.

TABLE 6

HOUSING STOCK DATA FOR ARIZONA AND COUNTIES

(in percents)

	Single Family Units	Apartments	Mobile Units
Apache	86	8	6
Cochise	75	14	11
Coconino	71	19	10
Gila	80	8	12
Graham	88	7	5
Greenlee	85	7	8
Maricopa	73	20	7
Mohave	65	13	22
Navajo	84	9	7
Pima	71	20	9
Pinal	76	9	15
Santa Cruz	75	19	6
Yavapai	77	9	14
Yuma	67	14	19
State	74	18	8

Source: Bureau of the Census, 1970 Census of Housing, Vol. 1, Part 4, Tables 21 and 23.

QUESTIONS

66. What percentage of your community's housing stock is in single family units, apartments, and mobile units? (See Table 5 on page 54 or Table 6 on page 55.)

67. How will the loss of the direct employee households reduce the demand for housing? (Multiply the answer to Question 56 on page 43 by the answers to Question 66.)

68. How will the loss of the supporting employee households reduce the demand for housing? (Multiply the answer to Question 62 on page 45 by the answers to Question 66.)

69. What will be the total decline in housing demand? (Sum the corresponding answers to Questions 67 and 68.)

Transportation

As with housing, local citizens need to look carefully at the current transportation situation before planning for decline. They need to be aware of the extent, condition, and level of use of the present road system in order to plan effectively for a reduced demand on it.

In planning for reduced demand it is difficult to say exactly how much of the present system will be in excess. The community, nevertheless, must face hard decisions about which roads it will continue to maintain. Certainly those directly associated with the employer under consideration need to be taken into account. Will they still be necessary? For how long? As population density decreases, serious thought should be given to maintaining roads in such a way that a less dispersed community is encouraged. You will have to set priorites for your town. Maintenance of the central business district system and those roads which may help attract more visitors and tourists might come first. In considering these issues, citizens should note that reduced intensity of use may help to reduce deterioration of the street surface itself.

A major impact will probably be in the area of inter-regional transportation. As population declines, it is anticipatable that the type and frequency of transportation services may also decline. Commuter air service or the number of scheduled bus stoppings may no longer be justified. There is, unfortunately, little that local citizens can do to control these impacts.

QUESTIONS

70. What specific transportation needs will no longer be demanded by the impacting company?

71. What should be the transportation priorities in your community?

Summary of Section II

In this section we have touched on housing and transportation demands. A method for projecting the reduced demand for certain types of housing was put forth using figures for both direct and supporting employees. While it was acknowledged to be difficult to assess precise transportation needs, it was suggested that the community look carefully at specific areas of decreased demand and that it set priorities for road maintenance.

III. Environmental Services

Environmental service needs are directly linked to population. As population declines due to the loss of a major source of employment, the community will have to curtail its water, sewer, and solid waste disposal systems. As tax revenues decline, levels of these services will have to decline as well. The following discussion will help local citizens evaluate the extent to which environmental services can be cut back without reducing the quality of those services.

Water

Not only will decreased demand for services be a consideration, but the quality of service must also be maintained. In order to plan effectively for a curtailment of the system, evaluation of the current situation is needed first. What is the current demand? What is the source? What are the key characteristics of the system (pressure, quality, flow, and storage capacity?)

The basic data needed for projecting demand is population, although the social and economic characteristics of the population may have a bearing on consumption as well. Past trends in your community may be used to predict future demand based on population projections. Or a national average may be used:

Daily Water Use (Gallons Per Capita)	
Domestic	60
Industrial	62
Public	25
Total	147

To estimate the decreased demand for water in your community, multiply these figures by the projected population decline. With these figures in mind, you will want to discuss their implications with your town's Public Works Director. You will want to know if there are specific problems with the underuse of the distribution networks or with the production and pumping facilities. Finally, you will want to know if there will be an increase in the average cost of providing water service.

QUESTION

72. What is the projected decrease in daily demand for water? (Multiply the answer to Question 65 on page 49 by 147 gallons.)

Sewer

A decrease in population and water consumption will result in a decreased demand for sewage treatment. Federal standards will also have to be met as service is reduced.

As with projection of water needs, the first step in planning for future demand is to evaluate the current system. What is the capacity? Can levels of service be curtailed without disrupting the process? Environmental considerations may come into play as well.

To determine wastewater flow, you will have to use the projections arrived at in the last section for water demand. The general rule is that 60% to 70% of total water supplied eventually becomes wastewater. As in the case with water, you will want to explore the impact of this reduced demand on the average cost of providing the service.

QUESTION

73. What will be the decreased daily demand for wastewater treatment? (Multiply the answer to Question 72 on page 59 by 0.70.)

Solid Waste Disposal

The decline in population will change the amount, rate of generation, and possible type of solid waste produced in your community. Residential density may decrease and the service area may decrease as well. These and other changes will require reduced or different services.

In evaluating the current system, several questions need to be answered. What are the present collection methods? What is the storage capacity? Are private firms performing the service, and if so, will they be able to continue service under a reduced demand?

Communities should develop an overall plan for dealing with solid waste. The total population and housing picture needs to be considered as well as applicable federal and state regulations.

Summary of Section III

Environmental services will need to be reduced as population declines. For each system, water, sewer, and solid waste, the first step in planning for a reduction is the evaluation of the current situation: its capacity and level of service. Methods of projecting reduction in water and sewage treatment demands were put forth.

IV. Social Services

There is a whole range of social services which will be affected by the loss of a large number of jobs. The decrease in population will directly lead to a decreased demand for education, health care, public safety, and recreation. In addition, the change in the town's demography (characteristics of the population) may in itself require an adjustment in the level of social services. These are areas of most immediate, personal concern to the townspeople and deserve careful consideration by local citizens involved in the planning process.

Education

A decrease in the number of school-age children is one of the first impacts associated with a decline in direct employment. Careful planning is needed to pace manpower cutbacks with the decline in tax revenues. At the same time, the quality of the service offered must not suffer. Parents are likely to voice as much concern over this as any other issue. Local citizens need to be aware that educational impacts are determined by three major factors: 1) the number of school-age children in the area; 2) their educational needs; and 3) the capacity of the area's schools. Adjustments in the current system may have to be made in the form of decreased staffing, cutback or consolidation of facilities, and alteration of programs, curriculum, or teaching techniques. School consolidation may mean that some residential areas will no longer have neighborhood schools and students will have to commute further.

Research conducted in towns which might experience the type of population decline which we are addressing has indicated that employees will have an average of 0.8 school-age children. By multiplying this figure times the number of departing employees, an estimation of the number of departing school-age children will be obtained. The resulting figure may then be applied to either an accepted student/teacher ratio of 24 to 1 or the historical ratio for your town. The reduced number of teachers that will be needed can then be determined. Not included here, however, is the reduced demand for non-teaching certified employees and non-certified personnel.

It should be re-emphasized at this point that this number of school children to be lost is a final figure, and that a community at the beginning of this process of decline will have to deal with a long period of attrition before this full figure is reached. Planning should be carried out accordingly.

A major consideration is the level of educational services to be offered. Once you know what the enrollment impacts on the educational system will be, you can make the proper decisions regarding the cutback of services. It should be remembered also that the financial capabilities of the community, community concern about education, and any additional funds available will all play a part in the decision-making process.

QUESTIONS

74. What will be the long-term decrease in the number of school-age children? (Add Question 56 on page 43 and Question 62 on page 45; then multiply the result by 0.8.)

75. What will be the decreased need for teachers in your community? (Divide the answer to Question 74 by 24.)

Health Care

The demand for health care services depends on the social and economic characteristics of the population. As the population declines, facilities and services will have to be cutback and some may have to be eliminated. But any special needs which may arise in this period will also have to be responded to.

For example, demand for mental health and counseling services may increase during this time. As workers are forced out of their jobs and incomes dwindle, pressures may build up which could lead to family problems, alcoholism, and so on. These services are best provided at the local level.

The larger picture of medical services is more of a regional, than a community concern. No small town can be expected to provide the full range of services offered in a larger city. Of more immediate concern will be the provision of special services at the local level. The key to this question is in the characteristics of the population. As these change through the process of decline, so will the special services demanded. Local citizens need to make sure that these continue to be provided at the local level in spite of a decreasing population.

QUESTION

76. What special health services may be required in the process of decline?

Public Safety

Police and fire protection needs are based on population size and characteristics. With a decline in population and a change in its characteristics, levels of service will have to be adjusted. If it becomes necessary

to cutback personnel, care should be taken that response time to remaining citizens is not seriously affected due to a more dispersed residental pattern.

In order to determine how the public safety requirements of your community will change following population decline, it will be necessary to get an understanding of the capacity of current systems. Discussions with police, sheriff, and fire administrators will reveal how their services can be most efficiently curtailed. You will want to find out the historical ratio of safety personnel to population for your town, and in conjunction with the administrators, work to maintain this ratio.

QUESTIONS

77. What is the current number of uniformed police officers in your community? (Ask your Chief of Police or equivalent administrator.)

78. What is the current ratio of population to police officer? (Divide current population by the answer to Question 77.)

79. What is the expected decreased demand for police officers? (Divide the answer to Question 65 on page 49 by the answer to Question 78.)

80. What is the current number of firemen in your community? (Ask your Fire Chief or equivalent administrator.)

81. What is the current ratio of population to fireman? (Divide current population by the answer to Question 80.)

82. What is the expected decreased demand for firemen? (Divide the answer to Question 65 on page 49 by the answer to Question 81.)

Quality of Life

One final consideration which lies outside the areas of impact already discussed is the change in your community's quality of life. The departure of a large number of residents and the falling into disuse of a number of structures will significantly change the landscape of your community. It will mean a modification of the lifestyle to which long-time residents are accustomed. This may be positive in one sense, however. Noise and pollution

levels may decrease, traffic may become less congested, and the general pace of life may slow down. These and other changes will result from not only the numerical decrease in population but a qualitative change in the demography as well: that is, the type of people living in your town may change in terms of age, marital status, family size, ethnicity, and socio-economic position. These changes in the quality of life of your town are not really measurable in the sense that we have measured changes in employment, population, and services. They are, nonetheless, important and merit careful consideration by community leaders since it is sometimes these unmeasurable impacts which are of most concern to long-time residents.

Summary of Section IV

In this section we have looked at a range of social services that will be affected by a drop in population. Educational services will have to adjust to a decline in the number of school-age children. A way of predicting this decline and the reduced needs for teachers was suggested. Health care needs were discussed in a regional context. But local officials need to be mindful of any special services that the townspeople will require. Public safety will also be affected. Here it was suggested that citizens be aware that the reduction of manpower may increase the response time to remaining residents who may be more dispersed than before. A final note was added on the quality of life. While this area of impact is unmeasurable, it still merits careful consideration by those involved in the planning process.

CONCLUSION

What we have attempted throughout Part B of this handbook is to give local community leaders a proper perspective from which to view the loss of a large number of basic jobs and associated tax base. The goal has been to foster a certain level of awareness of the kinds of problems a community must face in this situation. We have not attempted to provide definitive answers, the type of precise answers which professional consultants can offer. Rather, we have tried to make the user of this handbook aware of the basic dynamics of the impact process so that he will be able to ask proper and knowledgeable questions. At the same time, by working through the handbook, the user has arrived at estimates of the impact of decline on several areas within his community: employment, population, environmental services, and social services. Finally, it is hoped that aided by an increased awareness of the impact process and these estimates of impacts on various areas, community leaders and the community as a whole will be less fearful when faced with an imminent loss of jobs and will be better able to direct the future of their town as they see fit.

PAPERS IN COMMUNITY DEVELOPMENT

NO. 1. A Citizen's Handbook for Evaluating Community Impacts, by Lay James Gibson, Marshall A. Worden, and Michael S. Solot, 1979.

NO. 2. Socio-Economic Indicators For Small Towns, by Douglas Dunn and Douglas C. Cox, 1979.

NO. 3. Marketing The Uniqueness of Small Towns, by David H. Hogg and Douglas Dunn, 1979.

Individual papers are available for $1.75 from the Rural Information Center, Community Development Program, Cooperative Extension Service, College of Agriculture, University of Arizona, Tucson, Arizona, 85721.